



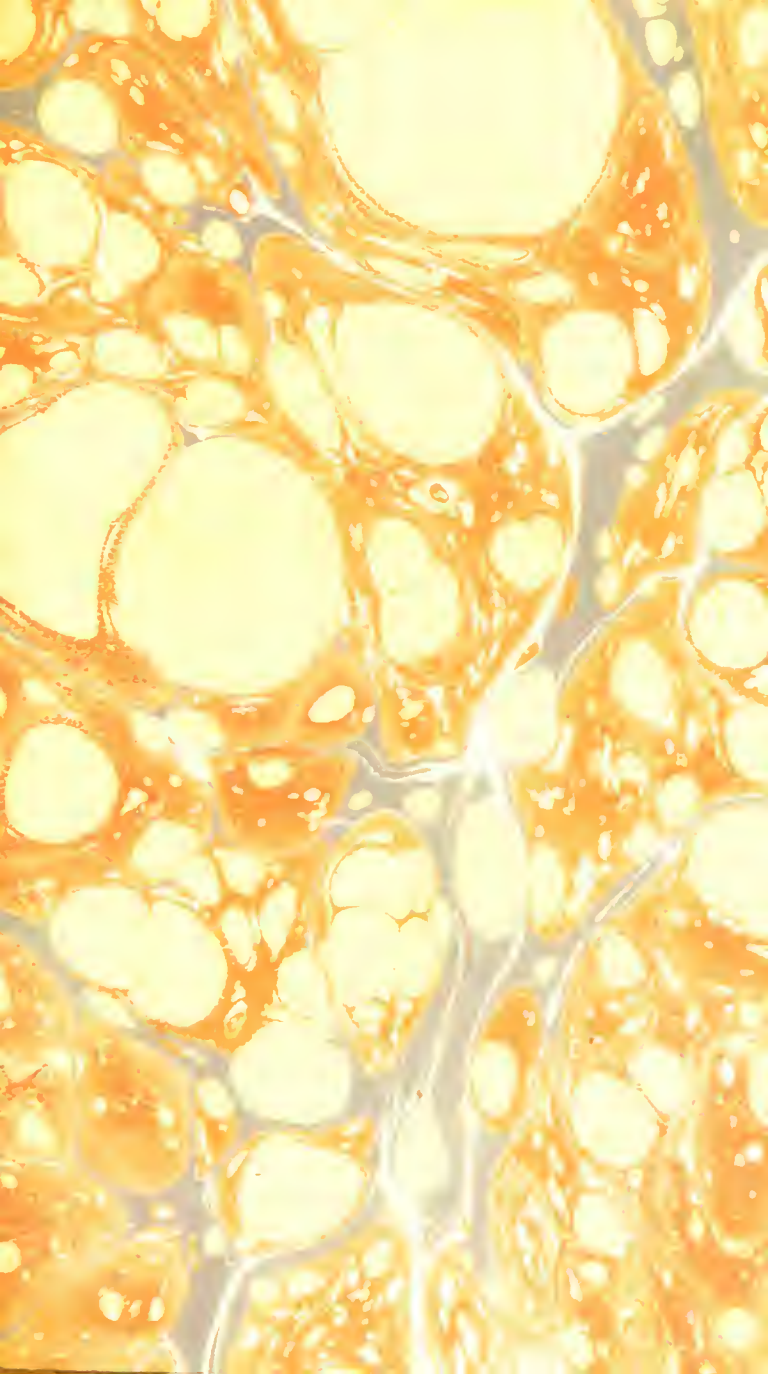
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A  
SHORT SKETCH  
OF  
*A FEW EXPERIMENTS,*

MADE BY  
CLEMENT ARCHER, M. D. M. R. I. A.  
*Late Lecturer on Chemistry, &c. in*

DUBLIN,  
*And at present a Physician at*  
BATH,

TO ASCERTAIN  
The Nature and Properties  
OF  
TWO SPRINGS  
OF  
MINERAL WATER,

Lately discovered by  
COLONEL RIDDELL,  
In the Garden of his Cottage, (called *Cambray Cottage*)  
CHELTENHAM.

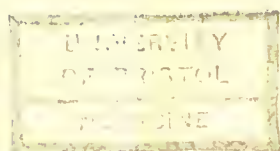
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Sapientis Medici est, eorum locorum aquas ubi medicum facit,  
convenienti examine probe scrutari, quo postea cum fructu, tam  
preservando quam sanandi gratia, illis uti posset.      HOFFMAN.

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1806.



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TO THE

RT. HON. GEORGE OGLE,

*Knight of the Shire for the Co. of Wexford,*

IN THE IRISH HOUSE OF COMMONS,

For 27 Years ;

REPRESENTATIVE FOR THE CITY OF DUBLIN,

In the first Imperial Parliament ;

AND

*One of the Governors for the County of Wexford,*

*&c. &c. &c.*

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*MY DEAR SIR,*

PERMIT me to dedicate the following short Tract to the oldest and best Friend that time has spared me. As an offering at the Shrine of Friendship, and as a small memorial of the respect and veneration in which I have always held the classical refinement of your Taste as a

Scholar, the unsullied Purity of your Honor as a Gentleman, your incorruptible Integrity as a Representative of the People, and your inviolable Attachment, conspicuous at all times, and in all circumstances, to our Constitution in Church and State, as established (I hope unalterably and irrevocably) at the Glorious Revolution : can I flatter myself, that it can be considered worthy of your attention or acceptance. With the most perfect regard and esteem,

I have the honor to be, my Dear Sir,

Your most obedient Servant,

And most sincere Friend,

CLEMENT ARCHER.

*Cheltenham, 16th September, 1806.*

A SHORT SKETCH  
OF A  
*FEW EXPERIMENTS,*  
which were made to ascertain  
The Nature and Properties  
OF  
TWO SPRINGS  
OF MINERAL WATER,  
*&c. &c. &c.*

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SITUATION OF THE SPRINGS]

THE pumps which produce this water are in the garden of a neat lodge, called Cambray Cottage, at present in the possession of Colonel Riddell, which is situated on the north side of the little River Chilt, about one hundred and fifty yards south of the principal street of Cheltenham. The Soil through which the water rises is sandy on the surface; but the Substratum is a bed of Argillaceous Blue Marl, upwards of twenty feet deep, in

which several marine productions—such as Bivalve Shells, *Cornua Ammonis*, &c. covered with Sulphate of Iron,—and a pair of Deer's Horns, encrusted with Ferruginous Matter, have been found ; and intermixed with veins of reddish Ochrous Clay. From a thick bed of coarse Gravel, which lies immediately under the Stratum of Marl, the water springs so copiously as to fill the well to the height of twelve feet in the course of eight or ten hours.

The discovery of this water, in September, 1804, was entirely owing to chance. The then proprietor of the cottage, having occasion to sink a well to supply water for the ordinary purposes of his house, contrary to his expectations, found that the water, instead of resembling that of the springs in the adjoining premises, was possessed of a peculiar smell and taste ; a circumstance he was at first studious to keep secret, because, having built the house for the accommodation of the company who visit Cheltenham, he was afraid

that if it should be known that it was supplied with water of a suspicious quality, it might interfere with the letting of his lodgings : and because he was just at that time on the point of disposing of the concern to the present possessor, to whom the public are indebted for the discovery, that, instead of being unwholesome or disagreeable, the water is a pleasant and salubrious Chalybeate ; and as such he drank it himself, and recommended it to several of his friends with advantage.

Having occasion to visit Cheltenham in the month of May last, I was, merely to gratify my own curiosity, and to enable me to satisfy some friends, who were inquisitive to be informed concerning the Nature and Properties of the Water, and not with any view to publication, induced to make a few Experiments on the water ; an account of which, incomplete as they are, I, at the request of my friend, Colonel Riddell, now commit to the press ; for though I am far from con-

sidering them as any thing even approaching towards a *perfect* Analysis, yet, I am satisfied, that what I have done will be sufficient to apprize the Public, that the Water seems to be as likely to prove efficacious in the treatment of several Diseases, highly difficult to cure, as any of the more established Chalybeates in the United Empire.

The experiments alluded to were made in June last, in the presence of a considerable number of the most respectable water-drinkers at that time in Cheltenham ; but, as a second spring of similar water has been discovered in the same garden, since that period, I submitted the water of both Pumps to the following Series of Trials, with the same Tests or Reagents, on the 30th of July last.

### TEMPERATURE.

A very sensible Thermometer, made by Fassana, London, to Fahrenheit's scale, shewed the Temperature of the Water nearest the Brook

(which, it may be necessary to observe, is under cover in one of the out-offices belonging to the cottage) to be  $47^{\circ}$ , at 8 o'clock in the morning on the 30th of July, while that of the other pump (which is open to the influence of the sun in the garden) fluctuated from  $48^{\circ}$  to  $49^{\circ}$ . This slight difference, however, I imagine, is to be ascribed solely to the circumstance of the former being under cover, while the latter is exposed to the action of the Sun's rays; for I am informed that the water rises from pretty nearly the same depth, through the same kind of soil, in both wells.

### ODOUR.

The water of the Spring nearest the Brook, when fresh drawn from the pump, emits a faint Sulphureous, combined with a strong Chalybeate, Smell; both of which are dissipated by standing a few hours in an open vessel, and by boiling. The Hepatic Odour is less perceptible in the Water of the Pump in the Garden, than in that in the Laundry.

## COLOUR.

The water of both Pumps, when fresh drawn, is perfectly transparent ; but after standing for a short time in an open bason, during which it may be observed to detach Globules of Air to the sides of the vessel, and to emit them from the surface of the water, it gradually precipitates a thick Ferruginous Sediment, which is at first suspended in and diffused through the whole Mass of the Fluid : but it soon falls down to the bottom of the vessel, and leaves the superincumbent liquid clear and pellucid.

## TASTE.

The Taste is strongly Chalybeate, followed by a sensation of roughness, astringency, or, what may possibly be more expressive of the sensation, Metallic Stypticity.

## SPECIFIC GRAVITY.

Not being provided with a proper apparatus, I was prevented from determining this point with



the degree of accuracy I could have wished ; but, from a few trials which I made, by weighing equal measures of Cambray Water and of the Chalybeate in Barrett's field, I am inclined to think they do not differ much as to Specific Gravity ; and it has been ascertained by Dr. Jameson, that that of the latter spring, at the temperature  $47^{\circ}$ , is, 10,002.

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## EXPERIMENTS

WITH

*CHEMICAL TESTS, OR REAGENTS.*

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EXPERIMENT I.

A SINGLE drop only of *Tincture of Galls* having been let fall into a large tumbler full of the Water, fresh drawn from each of the pumps, a beautiful dark purple cloud began to diffuse itself in, and to float through the Water ; which gradually subsided in part, in the course of a few hours, to the bottom of the glass in the form of black Powder ; while the remainder continued to be suspended on the surface of the fluid, as a black Film or Pellicle, for several days. These appearances were rather more striking in the Water of the pump in the Laundry, than in that which is in the Garden ; from which it may be inferred, that the former Water is rather more strongly impreg-

nated with Iron than the latter. The difference, however, is so trifling that it is scarcely necessary to be adverted to.

### EXPERIMENT II.

On mixing a few drops of the *Prussiate of Pot-Ash* with a wine-glass-full of each of the Waters, a dark azure colour was instantly produced ; and after the mixture had stood for a few hours, a dark blue powder was precipitated.

### EXPERIMENT III.

Both these Experiments were repeated upon Water which had been boiled ; but neither the *Tincture of Galls*, nor the *Prussian Alkali*, produced any change of Colour in, or precipitation from, either of the Waters in this state.

### OBSERVATION.

\* As *Tincture of Galls* and the *Prussiate of Pot-*

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\* The sensibility of this Test is so great, that Bishop Watson

*Ash* are the most sensible Tests with which we are acquainted, for the detection of Iron in solution in Water, it is evident that both the Waters in the Garden of Cambray Cottage are strongly Chalybeate ; and as the experiment upon the Waters, after they had been boiled, shews that the Water is enabled to retain the Metal in a state of such minute division of its particles as to be invisible only through the intermediation of a volatile or elastic substance,—I made the following Experiment to determine what the nature of the intervening Elastic Fluid or Fluids might be.

#### EXPERIMENT IV.

I added a few drops of *Tincture of Litmus* to a wine-glass-full of each of the Waters, fresh from their respective pumps, which caused a beautiful reddish purple tinge to spread itself throughout the Water, wherever the Tincture passed.

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tells us that infusion of Galls tinged purple 15 gallons of water, in which only one grain of Vitriol of Iron was dissolved

1 *Watson's Essays*, p. 214.

## OBSERVATION.

This Change of Colour indicates the presence of *Carbonic Acid Gas*, formerly called *Fixed Air*, partly combined, and partly semi-combined; for we are informed by that accurate, ingenious, and indefatigable Chemist, Mr. Kirwan, “that if the  
 “semi-combined part amount to one-sixth of the  
 “bulk of the water, the redness will be so much  
 “the more distinct as the bulk of the air approaches more to that of the water, or exceeds  
 “it. Thus waters containing aërated Earths, or  
 “aërated Iron, hold *Fixed Air*, partly combined  
 “with the earth or iron, and also some excess;  
 “which Mr. K. looks upon as semi-combined,  
 “because it enables the Water to hold the Earth  
 “or Iron in transparent solution. So the Waters  
 “of *Scydschutz*; though they hold both aërated  
 “Lime and aërated Magnesia, and consequently  
 “both combined and semi-combined *Fixed Air*;  
 “yet, as the semi-combined part amounts to only  
 “one-sixteenth of the bulk of the water, *Infusion*

“ of *Litmus* is not reddened by it. This Infusion  
 “ is scarcely reddened by the Waters of *Enghein*,  
 “ which contain six cubic inches of *Fixed Air* in  
 “ 48 of water (that is one-eighth), it being semi-  
 “ combined.”

I have adduced this argument from the work of my learned and much-respected countryman, to shew that the Waters of Cambray Cottage contain a very considerable portion of semi-combined Fixed Air, in addition to that which is employed to enable the Water to hold the Iron in solution.

### EXPERIMENT V.

The addition of *Lime Water* to that of both the springs in the garden of Cambray Cottage renders them milky ; boiling, however, destroys the milkiness in an instant.

### OBSERVATION.

These Phenomena are an additional Proof that

these Waters are plentifully supplied with Fixed Air ; which is dissipated by boiling.

### EXPERIMENT VI.

Letters written with a Solution of *Cerussa Acetata* become of a pale yellowish brown colour, on being suspended over a vessel of the Cambray Waters exposed to warm sunshine ; a proof that they, in addition to their *Carbonic Acid Gas*, contain *Sulphurated Hydrogen Gas*, formerly called *Hepatic Air*

### EXPERIMENT VII.

A Solution of *Nitrate of Silver* occasioned a cloud which was at first white, but in a few minutes became dark purple.

### EXPERIMENT VIII.

A few drops of an Aqueous Solution of *Acid of Sugar*, being mixed with these Waters, instantly exhibited the appearance of white streaks wherever the Solution passed through the water. This

Experiment shews that these Waters hold Calcareous Earth in Transparent Solution.

### EXPERIMENT IX.

Solutions both of pure *Pot-Ash* and pure *Ammonia* produced white Precipitates in each of the Waters ; which declare that they both contain Magnesia.

### EXPERIMENT X.

A Solution of *Nitrate of Barytes* being added to the Waters occasioned no change whatever in them, which is a most decisive indication that they are not impregnated with a single particle of *Nitric* or *Sulphuric* Acid, as it is more generally called, in combination or otherwise.

### EXPERIMENT XI.

*Soap* curdles, on being mixed with these Waters while they are cold, and fresh from the spring ; but, after they have been boiled, they make a pretty uniform and smooth-looking lather.



## EXPERIMENT XII.

*Green Tea*, on being infused in these Waters while cold, becomes blackish ; but after they have been boiled (which I have shewn) deprives them of their Air and Iron, or at least precipitates the latter from its chemical combination with the water : they make very good Tea of the same colour as if it had been infused in pure distilled water. For the same reason Port Wine and Brandy, which have been kept long in an oaken cask, are blackened by the addition of a cold Carbonated Chalybeate, but are not affected by waters of this description after they have undergone the process of boiling. Thus then we see, that not only Galls, but all other Astringent Vegetables, are good Tests to discover Iron in Water.



Here ended my Experiments upon these Waters ; which, though, as I have already said, I by no means look upon as sufficient to enable me to deter-

mine the exact proportions of the gaseous and solid contents ; yet, they enable me to declare that they are as pure and as good a Chalybeate as we are acquainted with. In this assertion I mean to confine myself to the Chalybeates of Great Britain and Ireland, the Analysis of which have appeared in print.—They may, I am induced to think, be said to hold an immediate rank between what Doctor Saunders calls *simple* and *highly Carbonated Chalybeates* ; that is to say, they appear to contain rather more *Carbonic Acid*, in proportion to their Iron, than the Tunbridge Water ; less, in proportion to the Iron, than the Spa and Pyrmont Waters : the discovery of them cannot therefore fail of being of the utmost importance to the Invalids who annually visit Cheltenham ; for their tonic and invigorating powers seem calculated to correct, or prevent, the debilitating effects which sometimes succeed a long protracted use of the Purging Waters. Doctor Saunders has declared in his Essay on Mineral Waters (page 285), that all the effects which Mineral Waters can produce in cer-

tain *classes, genera, species* and *varieties* of Diseases, which are highly refractory and difficult of cure, may probably be commanded by the two Springs of Cheltenham and Bath ; but had the learned Doctor been acquainted with the Chemical Analysis of the Cambray Cottage Water, even in the unfinished state in which I venture to lay it before the Public, I am induced to think he might, in several of the Diseases at least, have confined his Observation to the two kinds of Water now to be met with in CHELTENHAM ITSELF.

As this is not a Tract on the Practice of Medicines, but a simple and unadorned detail of Chemical Facts, I shall not enter minutely into an account of the various cases to which the Cambray Cottage Water is particularly applicable ; but shall content myself with the following fact—that I have observed it to have been peculiarly serviceable in cases of Dyspepsia, and several other complaints which arise from Loss of Tone, either of particular Organs, or of the System in general : in which

(to use the words of Doct<sup>r</sup> Boerhaave, *Tractatus de Pharmacia* on Chemistry, &c. in the *Stomach*) acts as a Tonic, Diuretic, and sometimes is a Diaphoretic ; it operates as a very gentle Stimulous, and constitutes a mild, but active Medicinal Compound, well calculated to strengthen the Stomach, and promote Digestion ; to cleanse the First Passages, to purify the Chyle and Lymph, and clear the whole Glandular System. By uniting with the Bile, and other Alimentary Fluids, in its passage through the Intestines, it stimulates the Glands, which are dispersed upon the surface of the Intestinal Canal, to pour out their contents ; by which it, in some measure, delerges the Biliary Ducts, and the Excretions of the Spleen, Pancreas, and other Viscera. It likewise gently stimulates, excites, and ultimately strengthens the Urinary Organs, and gives tone to the Lacteals or Absorbent Vessels, which are distributed upon the Coats of the Intestines, and by innumerable mouths take up the nutritious part of our food, and convey it to the blood, and makes them perform their functions more vigorously, and consequently more perfectly.

As an external application these Waters may be advantageously used cold as Lotions for several Affections of the Eyes, such as *Ophthalmia Membranarum*, *Ophthalmia Tarsi*, and as Lotions also for certain obstinate dry, branny, herpatic Eruptions on the Skin, and as Injections in *Leucorrhæa*, in which last disease their internal exhibition may also prove highly beneficial.

It has been rightly observed by that judicious Practitioner, and justly celebrated Teacher of the Practice of Medicine, Doctor Saunders, that it is a question interesting, not merely to the Chemist, but to the practical Physician, to have the quantity of the Iron, as well as its mode of combination, in Chalybeates ascertained with the utmost possible degree of exactitude and precision. As no Medical Man can be more aware of this fact than I am, it was my intention to have provided myself with an apparatus with which I could have collected and measured the Gasses, and determined the solid contents of this Water ; but time will not now ad-

mit of this ; I must, therefore, postpone this important part of the Analysis until some future opportunity ; but, in the mean time, I must beg leave to repeat that, from comparing the Experiments which I have made upon these Waters, with trials, exactly similar in their nature, on the Water at Tunbridge, (by Dr. Babington) ; on the Crescent Waters, at Harrowgate (by Dr. Garnett) ; with the Waters of Castle Connell and Ballyspelling, in Ireland, (by Dr. Ruty and others) ; I think I am warranted in having said that the newly-discovered Water of Cambray Cottage, at Cheltenham, is equal to any of them in its chemical composition, and cannot consequently fail to produce similar Effects in the Cure of the several Diseases to which such Chalybeates are usually applied ; under which conviction I not only recommended them to my Friends and Patients, but have drank them myself with greater advantage, during the great part of this season.

